

Feb/11/2004

## **Carbon-Carbon Composite Specimen Specs**

Fiber Materials, Inc.  
5 Morin Street, Biddeford, ME 04005-4497  
Attn: Keith Meiler

Dear Keith,

I am attaching the **FINAL** specimen description for the **Carbon-Carbon tensile and CTE** specimens including the **REVISED** total number as agreed in your final cost estimate. As you note (pointed also out in our phone conversation) there is a slight change in the specimen dimensions. Specifically, for the tensile specimens the **ONLY** change is the width of the specimen head (from 7mm wide to 8.4mm wide) for ensuring that the composite will not fail at the “ears” during tension testing. The thickness of the tensile specimen remains 3mm.

Since changes in the tensile would induce changes in the CTE specimens (so the tight assembly shown in Figure 3 can be achieved), the CTE changed slightly. Specifically, the flair-out section changed to 5.4mm (from 4mm) and the rest of the CTE specimen to 4.4mm wide (from 3mm wide). The thickness of CTE specimen remains 3mm.

### **The following quantities of specimens will be necessary:**

<b>Y-direction TENSILE specimens</b>	<b>= 20</b>
<b>Y-direction CTE specimens</b>	<b>= 16</b>
<b>X/Y-45° TENSILE specimens</b>	<b>= 20</b>
<b>X/Y-45° CTE specimens</b>	<b>= 16</b>

All **dimensions** and **tolerances** are shown on the corresponding figures, including the number of specimens we will need to fabricate for each type. The desired composite is CC-223. BNL is shipping the block of 223 CC with overnight delivery. Material Documentation should accompany the shipped specimens.

### **NOTE-1**

- **Tensile specimen cross-sectional gage area (neck-down)** = **3mm x 3mm**
- **Tensile specimen head width** = **8.4mm**
- **CTE specimen thickness for both orientations** = **3mm**
- **The flair-out section for the CTE specimens** = **5.4mm**
- **CTE specimen width away from central (flair-out) section** = **4.4 mm**

### **NOTE -2**

The alignment 1.0mm-diameter THRU holes are there to assist the fabrication. If the machine shop feels that they can do it without the holes, then the holes can be ignored. If the holes must be made, the diameter DOES NOT have to be 1.0mm but something close to it that is achievable at the shop.

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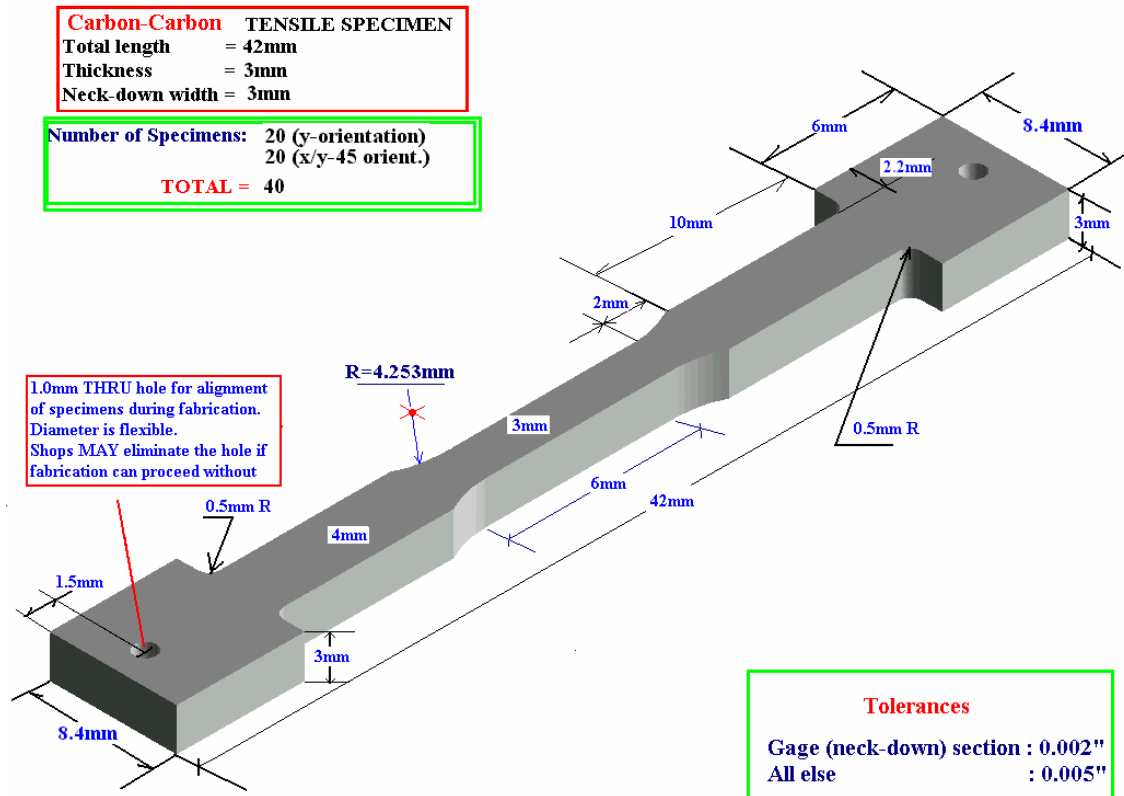
**NOTE-3:**

**Marking of individual specimens:** In order to identify each of the specimens before and after irradiation, a marking scheme is being optimized (that encompasses other specimens made of other materials as well) and will be sent to you prior to the delivery of the finished specimens.

**NOTE-4:**

Figure 3 depicts the arrangement of the CTE and tensile specimens when they go into the irradiation box. The dimensions have been chosen such that the two types mate perfectly. Thus, care must be taken so the specimens, when fabricated, can meet the requirement that is shown in Figure 3.

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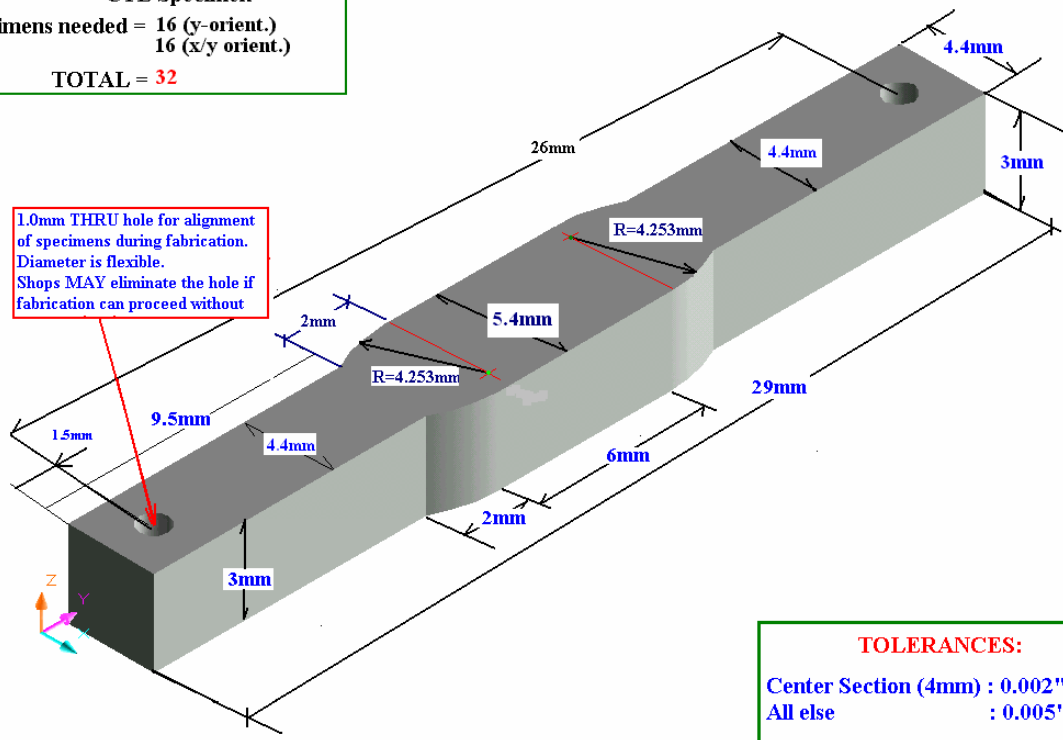
**Figure 1.** Carbon-Carbon Tensile Specimen

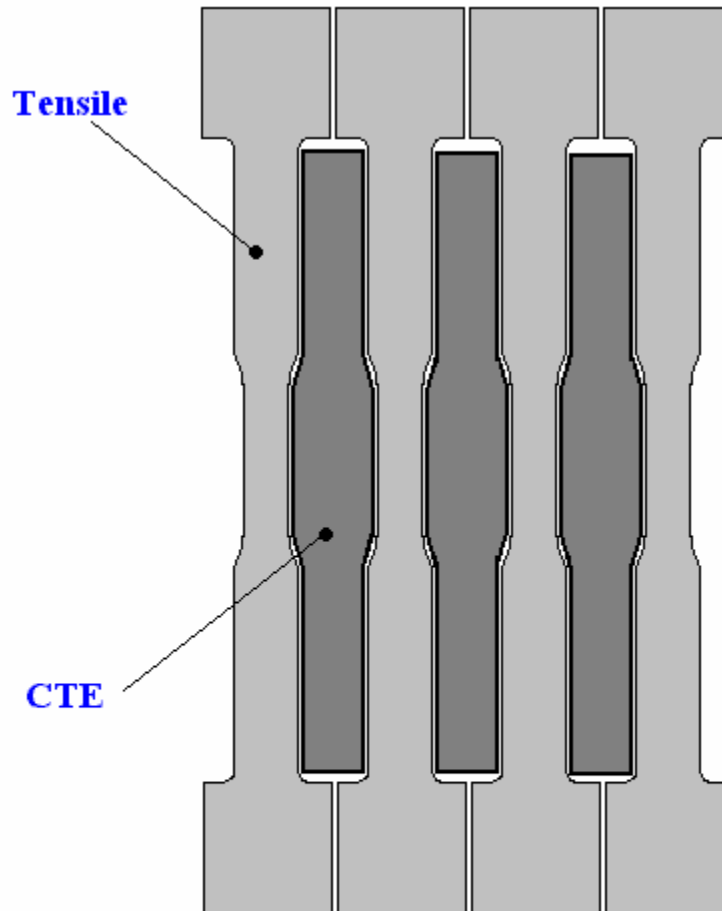
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**Carbon-Carbon CTE Specimen**

Specimens needed = 16 (y-orient.)  
16 (x/y orient.)

TOTAL = 32





### **Arrangement of Tensile and CTE Specimens**

Dimensions of tensile and CTE specimens have been specified such that the two types of specimens mate perfectly around the gage section

**Figure 3. Tensile and CTE specimen assembly and matching requirement**